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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

VASCULAR STREAKING OF STORED CASSAVA ROOTS

C. W. Averre, III[1/]

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Grateful acknowledgment is given to Mrs. J. F. Morton, of the Morton Collectanea, University of Miami, for obtaining some pertinent literature.

The cassava (Manihot utilissima Pohl. (Manihot esculenta Crantz)) was grown in the Southern United States and Florida many years ago (9), but sustained interest never developed until the recent immigration of Cuban refugees to Dade County. Cassava is grown on approximately 200 acres in Dade County and is sold largely in the Miami area. However, shipments of fresh roots to New York were rejected because of decay and dark discoloration in the fleshy roots. Shipping was in wooden boxes with moist sawdust and took approximately four days.

In storage of fresh cassava roots were subject to two problems: a soft rot that was caused by fungi and bacteria, and a dark bluish discoloration of vascular bundles. This vascular discoloration usually started from cut surfaces and progressed inward with great rapidity so that within four days roots twelve inches long were completely affected. Vascular streaking was more common toward the periphery of the root. In

FLORIDA AGRICULTURAL EXPERIMENT STATIONS JOURNAL SERIES NO. 2644

Post-Harvest Problems of the Yams (Dioscorea)

by D.G. Coursey

Tropical Products Institute

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England.

Report of the Study Group on the Evaluation and Utilisation of Genetic Resources in Tropical Root Crops

The genetic resources available in the field of tropical root crops include not only the germ plasms of the species involved, but also the body of information concerning each species, and the trained personnel capable of best utilizing such materials and information. The adequate utilization of these resources could best be stimulated by developing better systems of communication. When plant breeders and geneticists are better informed, they will be better able to make more rational decisions concerning programmes and objectives.

To facilitate communication, the Study Group recommends the establishment of a Tropical Root Crops Newsletter. The proposed newsletter would contain address lists of persons working on the genetics or breeding of such crops, periodic bibliographies of recent papers, lists of stocks or materials available for exchange, periodic summaries of the status of particular crops and short, informative research noted.

It is also suggested that the newsletter serve as the publication of a Root Crops Development Cooperative. The organization would serve not only to publish the annual letter, but would also serve to coordinate efforts to establish and maintain germ plasm collections. In addition, the possibility is visualized of the growth of this organization into a Root Crops Society.

RECENT TRENDS IN CASSAVA BREEDING IN INDIA.

M.L. MAGOON

Director,

Central Tuber Crops Research Institute,

Trivandrum - 10, Kerala,

India.

Cassava (Manihot esculenta Crantz.) is rapidly emerging as a crop of considerable importance in India. More than half a million acres are now under its cultivation in Kerala state alone which accounts for about 80% of the total acreage of this crop in India. Its capacity for producing large amount of food calories per acre, ability to adapt itself to erratic climatic conditions, resistance to locusts and several pests and diseases, easy culture, low labour requirements, low cost of production etc. are some of its unique features which further encourages the spread of its culture to several other regions of the country. Besides, being an important item of food for a large proportion of the population in Kerala, it provides cheap nutritive feed for livestock as well. Its tuber has innumerable industrial uses also, particularly for starch extraction (Magoon and Appan, 1966 a and b).

Though cassava has been under cultivation in India for a long time, improvement work on this crop has lagged behind. The field of activity concerning cassava breeding is thus only of recent origin and therefore, many fundamental as well as applied problems require yet to be grasped. A scheme of research on cassava was started in early years at Travancore University,

/Trivandrum ....

EDIBLE RHIZOMATOUS AND TUBEROUS CROPS OF INDIA (OTHER THAN POTATO)

B.C. KUNDU
Bose Institute, Calcutta, India

Many types of rhizomatous and tuberous crops are found in different parts of India. Most of them are not indigenous and have been brought to this country from South America, North America or Malaya. Although all of them are not used as food, there are quite a number which can be profitably utilized as food. In the present context of rapid increase of population and consequent shortage of food grains in India, improvement and increased production of various types of tuberous crops as food supplementing the cereals are considered very essential. In view of this, a survey has been made on the wild and cultivated rhizomatous and tuberous crops of India other than potato which can be used as food in supplementing cereals. An account of such crops is briefly presented in this article. Such root tubers as turnip, beet, carrot and radish which are mostly used as vegetables have not been dealt with here.

ALOCASIA NECK

Alocasia belonging to the family Araceae is a genus of herbs bearing short succulent rhizomes or rootstocks with large leaves. There are about 65 species distributed in tropical Asia of which 12 are found in India. Of these A.cucullata Schott., A. indica (Roxb.) Schott and A. macrorrhiza Schott are cultivated for their edible rootstocks. The rhizomes of A. fornicata Schott found in village shrubberies are often eaten by poorer classes of people.

Of the three cultivated species, A. indica is most important. It is a tall aroid with an underground rhizome bearing a succulent swollen stem, 10-20 cm in diameter and about 30 to 60 cm or more in length. It is cultivated in many parts of India, particularly in Assam and Bengal and is widely used as

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THE STERILITY-INCOMPATIBILITY COMPLEX OF THE SWEET POTATO

A Discussion by

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Crops Research Division, U. S. Department of Agriculture
Mayaguez, Puerto Rico

Sex has been well-established as the almost universal method of reproduction among animals and plants. The sexual process has many advantages to the species, chief of which is that it results in a constant reassortment of the genetic material, thus giving rise to new combinations which may have superior value. But the sexual process is complicated and demands a high order of control of physiological processes, and exact timing of events. The genetic information must be systematically halved, and the two halves from different parents intimately reunited. The newly formed individual must then be nurtured to a state of independence from either parent. Because the process is complex, it may be disrupted in numerous ways. Capricious external forces, inner physiological disturbances, or inadequate information from the genes themselves may interrupt any of the long series of steps in the normal reproductive process, reducing the potential number of progeny. We call this result sterility, but sterility is but an end product. In animals and plants, the study of sterility producing systems may not only be fascinating, but has numerous practical ramifications in everyday life.

It is interesting and noteworthy that plants in contrast to animals, usually have the two sexes in one individual, very often

UTILIZATION OF YUCA IN SWINE FEEDING

Jerome H. Manar[1], Julian Buitrago[2], and Ivan Jimenez[3]

Instituto Colombiano Agropecuario

and

The Rockefeller Foundation

The ever expanding world population demands a continued interest in increasing the quantity and quality of food produced to feed these new generations and to reduce the widespread pains of malnutrition that exist among much of the present population. The development and expansion of an animal industry must take this fact into consideration, and every attempt must be made by animal nutritionist to reduce competition between the human and animal population for available protein and energy sources.

Swine require large quantities of energy and moderate quantities of protein for their growth and development. In the leading pork producing countries of the world there exist large supplies of grains that are available for animal feeding. In other countries the annual production of all classes of grains is not great enough to satisfy the needs of existing human population; however, many of these countries have the potential or are already producing large quantities of other food sources that are available for livestock feeding if they can be

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The Discrepancy Between Social and Private Returns to Mechanization in the Early Phase of Economic Development

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Food Research Institute
Stanford University

The technical problems that are encountered in the mechanized production of tropical root crops are likely to divert attention from certain economic considerations that cast doubt on the wisdom of applying scarce resources of capital to the mechanization of root crop production. Increasing attention is being given, perhaps most vociferously in the United States, to a "world food crisis" resulting from rapid growth of demand for food which in a number of less developed countries is not being matched by equally rapid growth of domestic production. Although unprecedentedly rapid growth of population is the major component of this growth of demand, the increase in demand for food associated with rising per capita incomes is also an important factor.

The other conspicuous feature of the attention being given to the world food crisis is the growing recognition that expansion of agricultural output "depends predominantly," in Schultz's terminology, "upon the availability and price of modern (nontraditional) agricultural factors" (Schultz, 1964, p. 145). Closely associated with this emphasis on the need for farmers to make use of "a profitable new set of factors" is the conviction that agriculture has been assigned too low a priority in developing countries with resulting underinvestment and inadequate price incentives for farmers. Heady has even suggested that it would be a good policy to maintain "producer prices which favor growth and output

AN ECONOMIC VIEW OF THE DEVELOPMENT OF NEW PRODUCTION SYSTEMS:

With Particular Reference to Root Crops in the West Indies

by

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Head, Department of Agricultural Economics and
Farm Management

and

Mr. J. Cropper
Research Assistant

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ROOT CROPS IN THE BARBADIAN ECONOMY

- by -

E.G.B.Gooding
Barbados Sugar Producers Assoc., Barbados

The contribution of locally grown root crops to the diet of the Barbadian is considerable. It is difficult to assess their precise importance but some attempt towards this has been made.

For 1965-66 the official returns show that on plantations of 10 acres and over some 6,000 acres of root crops were planted, expected to yield over 24,000 tons (Table 1); total production, including that from peasant holdings, is about 7,000 acres yielding over 27,000 tons: the gross value of these crops is over 2½ million dollars. The food value in terms of calories is approximately 323 per head per day. Although some other predominantly carbohydrate foods are grown locally, for example breadfruit and bananas, most of the remainder are imported (Table 11). The approximate calorific value of these imports can be calculated (also in Table 11) and so we see that the locally grown root crops contribute about one fifth of the calories obtained by the local population from carbohydrate foods, other than from sugar itself. There can be no doubt of the importance of these root crops in the local diet.

STARCHY ROOTS IN THE DIETARIES OF DEVELOPING TROPICAL COUNTRIES

- by -

William O. Jones
Food Research Institute, Stanford University

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The Food and Agricultural Organization of the United Nations regularly publishes food balance sheets for about 65 countries. In 38 of these, starchy roots and tubers and starchy fruits provided more than 100 calories per person per day in 1964/65; in Poland and Colombia they provided more than 400 calories, in Paraguay more than 700, and in Uganda almost 1,000 calories. Not included in the set of food balance sheets are many of the countries of Africa and southeast Asia, for the very good reason that statistics of production and disposition (even statistics of populations for some countries) are so poor that the FAO statisticians have been unwilling to attempt to construct food balance sheets from them. The United States Department of Agriculture, which does not operate under the same proscription from adjusting official estimates that FAO must observe, has published estimated food balances for 90 countries. In 65 of these more than 100 calories per person per day are believed to come from the starchy roots and fruits, and in 18 countries of

THE SIGNIFICANCE OF ROOT CROPS IN THE TROPICS

- by -

Kenneth A. Leslie

University of the West Indies, St. Augustine

Numerous reports have told of malnutrition, undernourishment and even of starvation occuring in widespread tropical areas. Today, perhaps, the tropics is the world's principal food deficit region. This current situation represents one of the striking paradoxes of our times, for in the tropics, perhaps as much as 80 per cent of the inhabitants are engaged in agriculture. By contrast, in many developed temperate countries, with less than 20 per cent of their population engaged in agriculture, their peoples are reportedly overfed, and surpluses of basic food accumulate. These contrasts emphasise at once the primitive technology, and low agricultural productivity of tropical agriculture, and the low nutritional level of many tropical foods.

Yet, only in recent years have the quality and quantity values of tropical food supplies become subjects of serious study. In these circumstances it is not surprising that such limited agreement exists as to the nature and magnitude of tropical food deficiencies. The supplies of domestic foods have never been satisfactorily assessed.

The present paper will no doubt throw some light on the supply situation for it deals with the significance of a group of foods which have for centuries been basic in the diets of millions of tropical peoples. In particular, the paper reviews the relative importance of tropical root crops and in terms of

THE USE OF CROP PHYSIOLOGICAL STUDIES IN ROOT CROP AGRONOMY

by

P.H. Haynes, J.A. Spence and C.J. Walter

Introduction

In the past it has been customary to regard crop production largely as a technology. Efforts were concentrated on the actual details of field practice, such as seed and fertilizer rates, planting dates, and crop protection technology in relation to yields. Furthermore, much of this practice was arbitrarily determined or adopted because of tradition. The problems that frequently arise by such an empirical approach may be illustrated by reference to nitrogen fertilizer application to sweet potatoes. The literature on this subject indicates conflicting results in the attempts at relating nitrogen application to yield. (Stuckey 1914, Zimmerley 1929 and 1934, Leonard and Anderson 1947, Johnson and Ware 1948, Landrau and Samuels 1951 and Stino and Lashin 1963). As will be discussed later in this paper, detailed study of growth and development allows these conflicting results to be resolved (Walter 1966).

Thus agronomy is now seen as a complex of inter-relationships of a system made up of the plant, the soil and the atmosphere. For a proper understanding of this system it must be studied systematically through the growth cycle. This approach is useful in identifying the basic physiological processes determining yield in crops and at the same time enables an integrated view to be taken of the growth of the plant which is on the one hand understandable to the physiologist and biochemist in their concern in the changes in rates of processes, patterns of metabolism and influence of growth regulators, and on the other this dynamic approach is meaningful

THE ARROWROOT INDUSTRY IN ST. VINCENT
A CASE STUDY OF A UNIQUE ROOT CROP INDUSTRY

By C. I. Martin

The Commonwealth Caribbean has so far found it difficult if not impossible to produce agricultural commodities under competitive conditions. Indeed the survival of particular crop industries has, for the most part, depended on one of two conditions; either the product has been accorded preferential treatment in the metropolitan countries, or the producing territory has a monopoly on the production of the particular crop. The commodities that have been accorded preferential treatment (sugar, bananas) play a much greater role in Caribbean economies than those that are produced under monopoly conditions (arrowroot, nutmeg, pimento, sea island cotton) and hence the problems associated with the former have, quite naturally, been more widely discussed than those associated with the latter group of crops.

This paper deals with a 'root' crop, arrowroot, that has been produced under monopoly conditions. The theme of this case study is the limited technological progress in the Arrowroot Industry, and the absence of adequate arrangements for supply control and for marketing, which have left an important industry in a vulnerable state. A brief description of the arrowroot plant and of the history of the industry introduce the paper.

THE DEVELOPMENT OF THE INDUSTRY

Arrowroot (Maranta arundinacea) is a herbaceous prennial growing usually to about 3 feet and bearing oval leaves. The root stock forms cylindrical rhizomes below the soil surface. It is these rhizomes, which are about 9-12 inches long and 1 inch thick, that provide the starch that has made cultivation of the crop commercially feasible. The two varieties of arrowroot native to St. Vincent, the 'Banana' and the 'Creole' do not set seed and propagation has so far, been by means of rhizome bits. The plant is extremely resistant to adverse weather conditions and has hitherto, been subject to only one disease, the 'arrowroot

/burning.....